



**U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 2**

December 14, 2018

BY ELECTRONIC MAIL

Robert Law, Ph.D.  
de maximis, inc.  
186 Center Street, Suite 290  
Clinton, New Jersey 08809

Re: Remedial Action Objectives

Dear Dr. Law:

The U.S. Environmental Protection Agency is submitting the attached Remedial Action Objectives (RAOs) and discussion for inclusion in the Feasibility Study for the Lower Passaic River Study Area. The RAOs were developed in coordination with the Cooperating Parties Group (CPG) and the New Jersey Department of Environmental Protection (NJDEP). The attached memorandum replaces the version previously submitted on November 19, 2018.

Sincerely,

A handwritten signature in dark ink, appearing to read "Diane Salkie".

Diane Salkie, Remedial Project Manager  
Lower Passaic River Study Area RI/FS

Cc: Zizila, F. (EPA)  
Sivak, M. (EPA)  
Hyatt, B. (CPG)  
Potter, W. (CPG)  
Hayton, A. (NJDEP)  
Nickerson, J. (NJDEP)

## Remedial Action Objectives Technical Memorandum – December 14, 2018

EPA has developed proposed remedial action objectives (RAOs) for a potential source control interim remedy for the upper nine miles of the Lower Passaic River Study Area (LPRSA) in conjunction with the Cooperating Parties Group (CPG) and New Jersey Department of Environmental Protection (NJDEP). The LPRSA is Operable Unit 4 (OU4) of the Diamond Alkali Superfund Site. The proposed RAOs are:

1. Control the sediment sources of 2,3,7,8-tetrachlorodibenzodioxin (TCDD) and total polychlorinated biphenyls (PCBs) by remediating surface sediment source areas containing elevated concentrations, thereby reducing the surface weighted average concentrations (SWACs<sup>1</sup>) of 2,3,7,8-TCDD and total PCBs from river mile (RM) 8.3 to RM 15. Achieve a post-interim remedy 2,3,7,8-TCDD SWAC<sup>1</sup> from RM 8.3 to RM 15 of not more than 85 parts per trillion (ppt)<sup>2</sup>, approximately an order of magnitude higher than the OU2 (i.e., the lower 8.3 miles of the LPRSA) 2,3,7,8-TCDD sediment remediation goal (RG) of 8.3 ppt<sup>3</sup>, and achieve a post-interim remedy total PCB SWAC<sup>1</sup> from RM 8.3 to RM 15 that is at or below the established total PCB background concentration of 0.46 parts per million (ppm)<sup>2,3</sup>.
2. Control subsurface sediments (sediments greater than 6 inches below the sediment bed) from becoming sources of 2,3,7,8-TCDD and total PCBs by remediating sediments between RM 8.3 and RM 15 that have a demonstrated potential for erosion to expose subsurface concentrations above the defined subsurface remedial action levels (RALs) established for 2,3,7,8-TCDD and total PCBs<sup>4</sup>.

## Discussion

The overall objective of a potential interim remedy would be to eliminate/mitigate the most significant sediment sources of 2,3,7,8-TCDD and PCBs above RM 8.3<sup>5</sup>. In doing so, the interim remedy will eliminate elevated contaminant concentrations (and reduce average contaminant concentrations) of these two contaminants that could act as sources to biota and eliminate the

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<sup>1</sup> The SWACs apply to the reach of the LPRSA from RM 8.3 to RM 15 and will be calculated based on sediment data representing the surface interval 0 to 6 inches below the surface of the sediment bed. For the interim remedy FS, SWACs will be calculated using RI data and the conditional simulation approach presented in the draft RI Report for the LPRSA. SWACs will be recalculated post-interim remedy selection, based on pre-design sediment sampling data collected at high spatial density, and the recalculated SWACs will be used in the RD to define the interim remedy footprint. Post-interim remedy SWACs will be calculated based on surface sediment sampling data for 2,3,7,8-TCDD and total PCBs collected following construction of the interim remedy, including dredging and placement of capping or backfill material.

<sup>2</sup> In evaluating the post-interim remedy SWACs, the uncertainty in the SWAC calculations will be assessed. The post-interim remedy sampling will be designed and performed to identify an acceptable envelope of uncertainty in the SWAC calculations to support a regulatory determination regarding whether RAO 1 has been achieved. The evaluation methodology will be developed in the FS.

<sup>3</sup> The 2,3,7,8-TCDD RG (0.0083 ug/kg [8.3 ppt]) and total PCB background level (460 ug/kg [0.46 ppm]) are documented in Appendix II, Tables 25 and 26, respectively, of the ROD for the Lower 8.3 Miles of the LPRSA (dated March 3, 2016).

<sup>4</sup> The total PCB subsurface RAL is expected to be set in recognition that erosion has less ability to impact recovery for total PCBs than for 2,3,7,8-TCDD because of the importance of external PCB sources in controlling recovery.

<sup>5</sup> While the interim remedy FS focuses on a potential interim remedy addressing areas of elevated 2,3,7,8-TCDD and total PCB concentrations, other contaminants of concern will be addressed to the extent they are collocated. All site risks will be addressed in future decision documents for the LPRSA.

potential mobilization of elevated concentrations of the two contaminants that could be sources to other areas of the LPRSA.

In the interim remedy feasibility study (FS), remedial footprints to be evaluated for each remedial alternative (other than no further action ) will be delineated to meet both RAO 1 and RAO 2 (note that information contained within the RAO footnotes and discussion text in this document may be captured within the body of the interim remedy FS and not in footnotes; decisions regarding which information will be footnoted will be made as the interim remedy FS is developed). Consistent with RAO 1, EPA expects the FS alternatives for the source control interim remedy to include, at a minimum, alternatives that would achieve a post-interim remedy SWAC of 2,3,7,8-TCDD from RM 8.3 to RM 15 of 65 ppt, 75 ppt, and 85 ppt (to be met upon completion of the interim remedy implementation). The interim remedy FS will also identify the post-interim remedy SWAC reductions on a percentage basis. Derivation of SWACs, RALs, and remediation footprints in the interim remedy FS will be based on the remedial investigation (RI) sediment data and the conditional simulation approach documented in the RI. Within each alternative evaluated, subareas may be evaluated for achieving higher or lower post-interim remedy SWACs, and/or the alternatives may include varying 2,3,7,8-TCDD and total PCB RALs in discrete exposure areas or areas with specific attributes (e.g., areas expected to accumulate only limited amounts of new sediment). However, any such changes must not conflict with the objectives of the interim remedy including attaining RAOs 1 and 2.

RAO 2 addresses areas that have a reasonable likelihood of elevating the 2,3,7,8-TCDD and/or total PCB SWAC from RM 8.3 to RM 15 via erosion but are not targeted through RAO 1. These areas have the following characteristics: 1) they are erosional; 2) there is a reasonable likelihood that erosion would expose sediments 6 or more inches below the current sediment surface; and 3) those sediments, if exposed, have subsurface 2,3,7,8-TCDD and/or total PCB concentrations above the subsurface RALs<sup>6</sup>. In the interim remedy FS, areas with these characteristics will be identified using procedures currently under discussion amongst EPA, NJDEP, and the CPG.

In the remedial design (RD), it is anticipated that erosional areas will be primarily evaluated using observed bathymetric changes based on available bathymetric data. In the event that it is required to support the bathymetric analysis, a high-resolution hydrodynamic model of high flow event shear stresses conducted during the RD coupled with erosion parameters established for the LPRSA sediment transport modeling could be used. In the erosional areas, pre-design sediment sampling will characterize subsurface sediment concentrations of 2,3,7,8-TCDD and total PCBs within the depth interval of potential erosion and will support interim remedy design (note that pre-design surface and subsurface sediment sampling will be performed throughout the upper 9 miles of the LPRSA, and not only in erosional areas, as described further below).

If an interim remedy is selected, the approach to achieve RAOs 1 and 2 will be further developed and refined during the RD, following the interim remedy FS, a proposed plan, an interim Record of Decision (ROD), and the pre-design sampling. A sediment sampling program will be implemented between RM 8.3 and Dundee Dam prior to the RD to refine the pre-interim remedy

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<sup>6</sup> If multiple RALs are established for a given alternative (e.g., different RALs for shoal and channel areas), subsurface RALs will be designated in a manner consistent with surface RALs.

2,3,7,8-TCDD and total PCB concentration mapping, which will be used in the RD to refine (relative to the interim remedy FS) the footprint of the area targeted by the interim remedy to accomplish the RAOs. The pre-design sediment sampling spatial density is expected to be approximately 8 sediment cores per acre (based on cores completed at 80-foot centers on a triangular grid) but may vary depending on the density and/or age of existing data in specific areas and on specific data needs. The pre-design sampling data would also be used in the RD to identify areas for remediation to achieve the target post-interim remedy SWACs for 2,3,7,8-TCDD and total PCBs, specifically accounting for remediation of areas with concentrations exceeding RALs for 2,3,7,8-TCDD and total PCBs. In the RD, initial RALs, based on the conceptual site model for source control and the interim remedy FS, would be evaluated and modified, if necessary, to finalize RALs that will result in achieving RAOs 1 and 2. If developed and evaluated in the interim remedy FS, varying RALs may be applied in the RD to specific subareas or exposure areas.

Existing sediment data suggest the source areas to be targeted by the potential interim remedy are located between RM 8.3 to RM 15. However, the sediment data collected prior to the RD may identify additional source areas, including between RM 15 and Dundee Dam. If additional source areas are identified, they would be addressed in the interim remedy as necessary to achieve the RAOs.

Following implementation of an interim remedy, EPA anticipates that sediment sampling would be performed (in an appropriate timeframe to evaluate conditions immediately after the interim remedy) to verify RAO 1 has been met. Attainment of RAO 2 would be verified by confirming, through physical measurements, that the erosional areas targeted have been fully dredged to design depths. The source control interim remedy is intended to eliminate/mitigate the most significant sediment sources of 2,3,7,8-TCDD and PCBs above RM 8.3. If a remaining sediment source area is identified in the post interim-remedy sediment sampling dataset and contributes to not attaining SWAC targets, the remaining sediment source area may require remediation to accomplish the overall interim remedy objective. In evaluating the potential for remaining sediment source areas using the post-interim remedy data, careful consideration will be given both to in-situ sediment conditions and to residuals generated through the interim remedy and/or other activities in the LPRSA. Decisions related to potential further action under the interim remedy will be based on a decision framework to be developed in the FS.

During and after the interim remedy verification monitoring period, additional activities would be performed under an adaptive management program. This interim remedy will be managed to the extent feasible under an adaptive management approach, whereby new information is utilized to maximize the success of the project, throughout development, design, implementation, and post remedial monitoring. The adaptive management program will be described in the interim remedy FS.